

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.



(11)

EP 1 075 843 A1

(12)

EUROPEAN PATENT APPLICATION

published in accordance with Art. 158(3) EPC

(43) Date of publication:  
14.02.2001 Bulletin 2001/07

(51) Int. Cl.<sup>7</sup>: A61L 17/00

(21) Application number: 99938676.6

(86) International application number:  
PCT/RU99/00263

(22) Date of filing: 29.07.1999

(87) International publication number:  
WO 00/51658 (08.09.2000 Gazette 2000/36)

(84) Designated Contracting States:  
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE

(30) Priority: 03.03.1999 RU 99103732

(71) Applicants:  
, Sulamanidze, Marlen Andreevich  
Moscow, 115304 (RU)  
, Mikhailov, Georgy Marlenovich  
Moscow, 115304 (RU)

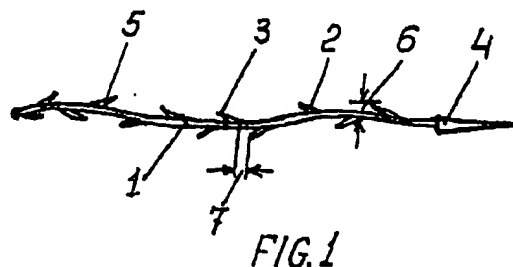
(72) Inventors:  
, Sulamanidze, Marlen Andreevich  
Moscow, 115304 (RU)  
, Mikhailov, Georgy Marlenovich  
Moscow, 115304 (RU)

(74) Representative:  
Targett, Kenneth Stanley  
48 Meadowsweet Way  
Horton Heath, Hampshire SO50 7PD (GB)

(54) SURGICAL THREAD FOR PLASTIC SURGERY OPERATIONS

(57) The present invention relates to a surgical thread (1) for plastic surgery operations, wherein said thread includes inclined protrusions which are arranged sequentially along the length of the thread and which are oriented in a direction opposite to that of the thread tension. The protrusions (2) are made in the shape of conical barbs having flexible and elastic sharpened ends (3). The portion of the barbs (5) at the end of the thread is oriented in a direction opposite to the first one in order to prevent any sliding displacement of said thread in the tissues. This invention also relates to a method for making the protrusions that preserves the rupture strength of the thread and that meets requirements concerning the

functional use thereof, i.e. that gives the surgical thread the capacity to be inserted through tissues in one direction only.



EP 1 075 843 A1

## D scripti n

## Technical field

[0001] The invention relates to medicine, to the methods of prosecution of surgical and plastic operations. In particular it relates to medical materials used in plastic surgery in cosmetic operations.

## The background art

[0002] The surgical threads for cosmetic operations are well known (Ya. Zoltan, «Operational technique and conditions of optimum healing of a wound»), Medicine, Budapest, 1977). The threads are made from different materials: metallic, polymeric, biological. General characteristics of the threads: strength, smooth surface, density, bioinertia. The threads must be well tied in knots while suture of wound, they must not elongate.

[0003] In dependence of the kind of operations different surgical threads are used (International conference «The present-day approaches to the development of effective dressing and sutural materials and polymeric implants»), 1995, Moscow, Institute of Surgery). These threads are metallic and made from tantalum, silver, nickel and other wires. Non-metal threads are made from lavsan, nylon, caprone, polypropylene, vikril, polysorb etc. Monolithic, wattled, twisted threads are used.

[0004] All these known surgical threads are characterized by one feature: they can be pulled through soft tissues, for example, skin, hypodermic tissue, along the whole length, there and back. This great advantage of surgical threads turns into essential disadvantage during some plastic operations. Thus while suturing a wound by an intradermic or subcuticular continuous suture, in order to strengthen the ends of the thread at the beginning and at the end of the wound it is necessary to suture the wound with an interrupted suture or to plaster the patches. This lengthens the operation time and makes difficult the process of taking away the suture; sometimes due to the instability of strengthening the edges of a wound part.

[0005] There are known methods of suturing wounds: interrupted, mattress, continuous etc.

[0006] For example, while performing continuous intradermic suturing by smooth threads, usually a suture is smoothed out along the length of the wound's line. In this case it results in a maximum length of scar, that is undesirable from the aesthetic point of view.

[0007] At the same time during the suture of a wound with uniform gathering of skin along the wound's line it is possible to obtain a shorter scar. In the case of the use of smooth threads it is impossible to obtain uniform corrugation of the wound's line along its length: the skin is more gathered at the edges, being more smoothed out close to the centre, in connection with this the necrosis of more gathered tissues and an unfavorable form of scar are possible. Meanwhile the use of the threads according to this invention with unidirectional penetrability through tissues allows one to obtain uniform moderate corrugation of the skin along the length of the wound and accordingly to obtain a shorter scar.

[0008] The closest to the claimed invention is a surgical thread with sequentially arranged along its length inclined protrusions with ends oriented in a direction opposite to the thread's pull (DE patent 4302895, A61L 17/00, published 04.08.94). The protrusions of this thread during its pull through the loop formed at the thread's end prevent its opposite displacement.

[0009] This outside fixation of the thread is used in different operations but this surgical thread doesn't provide its engagement with hypodermic tissues during the suture of wounds, which is especially important at plastic surgery operations.

## The disclosure of the invention

[0010] The raised problem is solved by the use of a surgical thread for plastic surgery operations made from metallic, polymeric or biological material, having sequentially arranged along its length inclined protrusions oriented in a direction opposite to that of thread pull; the protrusions are made in the form of conical barbs having flexible elastic sharpened ends, the portion of the barbs, not less than three, at the end of the thread being oriented in a direction opposite to the first one in order to prevent any sliding displacement of said thread in the tissues.

[0011] The invention is based on the problem of creation of surgical thread for plastic surgery operations with unidirectional penetrability through tissues, which provides the fixation of the thread's ends during the suturing of a wound by intradermic or subcuticular sutures without additional work and devices and allows to suture wounds with shortening of the length of a scar.

[0012] The raised problem is solved by surgical thread for plastic surgery operations made from metallic, polymeric or biological materials, which according to the invention has sequentially arranged along its length inclined protrusions with sharpened ends, the protrusions being oriented in a direction opposite to the thread's pull; the protrusions disposed at the end of the thread are oriented by sharpened ends in a direction opposite to the first protrusions.

[0013] It is worthwhile to make the protrusions with alternation in section of from one to four positions, the elevation of the protrusions' ends above the thread must be not less than the thread's diameter, and the interval between the protrusions must not be less than 1.5 times the thread's diameter.

[0014] It is worthwhile to make the thread's protrusions in the form of incisions on the thread with the ends bent back out of its diameter.

[0015] As a variant the inclined protrusions can be made in the form of needles with muffs for their fixation on the thread.

5 **Th brief description of figures**

[0016] Later on the claimed invention is explained by specific examples of its execution and by the drawings showing the following:

10 Fig.1 - shows a variant of surgical thread with an inclined protrusions in two positions in section;

Fig.2 - shows a variant of surgical thread with protrusions in the form of incisions in four positions in section;

Fig.3 - shows a variant of surgical thread the inclined protrusions of which are made in the form of needles with muffs;

15 Fig.4-shows sutured wound with the use of surgical thread without additional fixation of its ends.

Fig.5 - shows sutured wound by continuous intradermic suture with shortened scar.

20 **The basic variant of carrying out the invention**

[0017] The surgical thread 1 for plastic surgery operations with sequentially arranged along its length inclined protrusions 2 with sharpened conical barbs 3 oriented in a direction opposite to the pull of the thread by the needle 4. The portion of the protrusions at the end of the thread 1 is oriented by their ends in a direction opposite the protrusions 2. The elevation 6 of the protrusion's ends above the thread must not be less than its diameter, an interval 7 must not be less than 1.5 times the thread's diameter. When the protrusions 2 and 5 are made in the form of incisions shown on fig. 2 it is preferable to make the size of the incision's base 8 equal to 1/3 of the thread's diameter.

[0018] On fig. 3 the inclined protrusions of thread 1 are made in the form of needles with muffs 10 for their fixation on the thread.

30 [0019] All mentioned parameters of the protrusions and their execution are caused by the necessity of preservation of the rupture strength of the thread with the provision of flexibility-elasticity of the protrusions' ends and good engagement with hypodermic tissues preventing reverse displacement of the thread.

[0020] The scheme of suturing a wound by a subcuticular continuous suture 11 is shown on fig.4.

35 [0021] The thread 1 with unidirectional penetrability can freely penetrate through hypodermic tissues in a direction of needle 4 and on the exit is fixed from reverse sliding by the ends 3 of protrusions 2, the other end of the thread with protrusion 5 doesn't allow the thread to slip under the skin. During the removal of the suture the thread 1 is pulled back and cut off in front of the protrusion 5 and then it is freely pulled to the skin surface. So the thread provides the quality of suture of wound without its additional fixation at the ends, thus shortening the time of operation.

40 [0022] The effective method of the use of the surgical thread with unidirectional penetrability is shown on fig.5 during the operation with shortening of the operational scar. The method consists in that by needle 4 to which the thread 1 with unidirectional penetrability is fixed, the skin is pierced and the thread is inserted into the hypodermic area and the intradermic continuous suture is accomplished.

45 [0023] At each exit of the needle, for example, 12 and 13, the thread is pulled up into the opposite direction, the protrusions 2 by their ends 3 carry away the hypodermic tissue and gather the skin, forming uniform skin folds 14. As a result a shortened in length scar 15 with uniform gathering of the skin is obtained, which gives a good aesthetic effect. The skin's gathers are straightened in course of time.

**Industrial applicability**

50 [0024] The invention can be widely used in different plastic surgery operations. Besides it can be used in other surgical operations.

**The information sources.**

[0025]

55 1. DE patent 4302895 C2, A61L 17/00, published 04.08.94

2. Ya. Zoltan <<Operational technique and conditions of optimum healing of a wound>>, Medicine, Budapest, 1977, p.44-47, 58-63, 90-91.

3. Materials of the International conference «The present-day approaches to the development of effective dressing, sutural materials and polymeric implants», 1995, Moscow, The Institute of Surgery, p.314-316, 337-340.

4. US 5374268 A1, 20.12.94

5. GB 1506362 A1, 05.04.78

6. US 4069825 A1, 24.01.78

7. EP 0428253 A1, 22.05.91

#### Claims

1. A surgical thread (1) for plastic surgery operations made from metallic, polymeric or biological material, comprising sequentially arranged along its length inclined protrusions (2) oriented in a direction opposite to the thread's pull characterized in that the protrusions (2) are made in the form of conical barbs with sharpened flexible and elastic ends (3), the portion of the barbs (5), not less than three, at the end of the thread is oriented in a direction opposite to the first one in order to prevent any sliding displacement of the thread in the tissue.
2. A surgical thread (1) for plastic surgery operations according to claim 1 characterized in that the protrusions (2) are made with alternation in section of from one to four positions, the elevation (6) of the protrusions' ends (9) above the thread must be not less than the thread's diameter and an interval (7) between the protrusions must be not less than 1.5 times the thread's diameter.
3. A surgical thread (1) for plastic surgery operations according to claim 1 characterized in that the protrusions (2) are made in the form of incisions on the thread with the ends (3) bent back out of its diameter.
4. A surgical thread for plastic surgery operations according to claim 1, characterized in that the inclined protrusions are made in the form of the needles (9) with muffs (10) for their fixing on the thread.

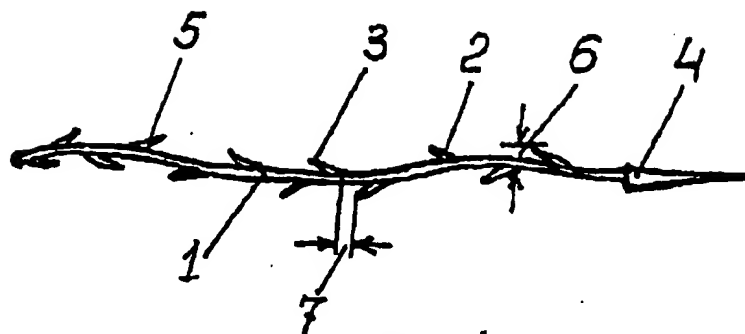


FIG.1

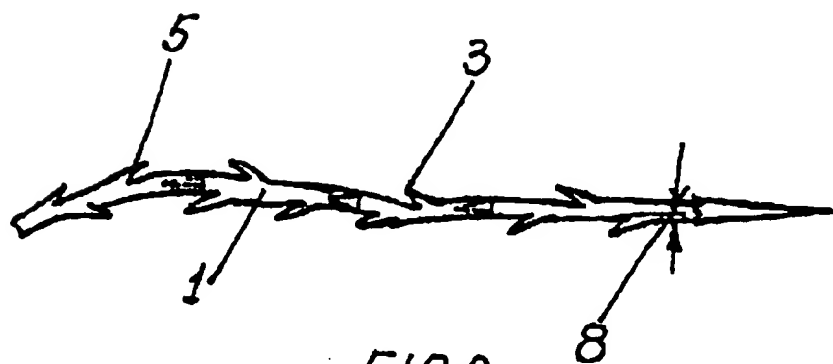


FIG.2

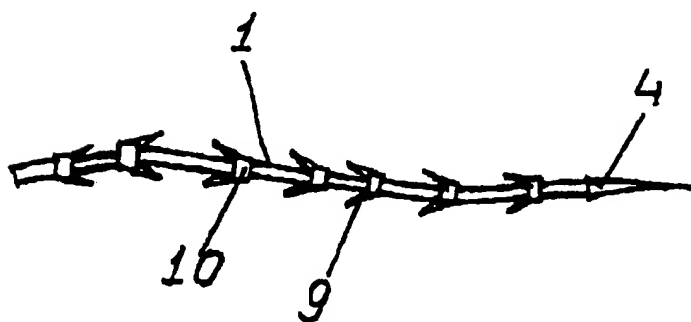


FIG.3

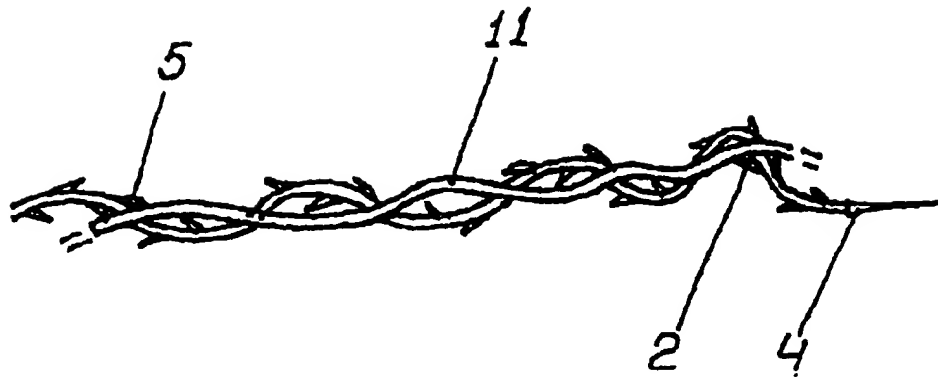


FIG. 4

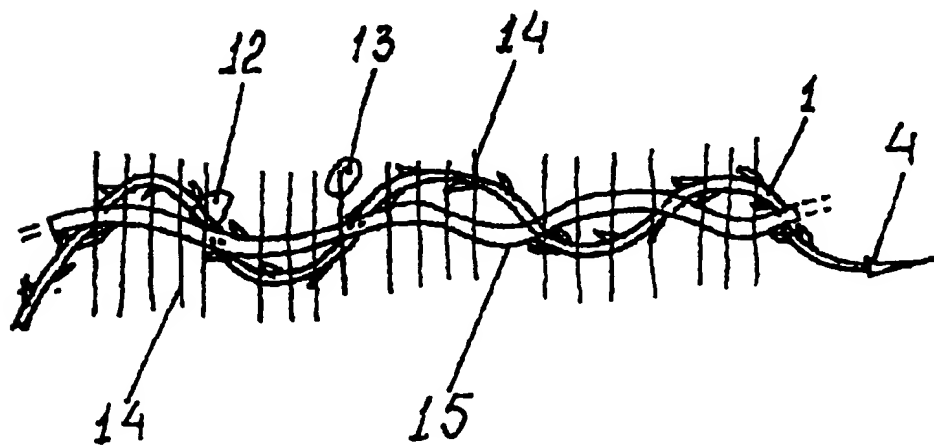


FIG. 5

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/RU 99/00263A. CLASSIFICATION OF SUBJECT MATTER<sup>6</sup>:

IPC 7 : A61L 17/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 : A61L 17/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 4302895 A1 (SEGAR-WIESSNER GmbH & Co KG), 04 August 1994 (04.08.94).	1 - 4
A	US 5374268 A (UNITED STATES SURGICAL CORP.), 20 December 1994 (20.12.94), the abstract.	1 - 4
A	GB 1506362 A (TAICHIRO AKIYAMA), 05 April 1978 (05.04.78), page 4, figure 1.	1 - 4
-/-		

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search  
15 November 1999 (15.11.99)Date of mailing of the international search report  
16 December 1999 (16.12.99)

Name and mailing address of the ISA/

RU

Facsimile No.

Authorized officer

Telephone No.